



**REPORT
70084**

**WORK PLAN ADDENDUM
STURGIS WELL FIELD
FEASIBILITY STUDY**

**PREPARED FOR:
MICHIGAN DEPARTMENT OF NATURAL RESOURCES
LANSING, MICHIGAN**

**PREPARED BY:
WARZYN ENGINEERING INC.
NOVI, MICHIGAN**

EPA Region 5 Records Ctr.



225125

APRIL 1989



Engineers & Scientists
Environmental Services
Waste Management
Water Resources
Site Development
Special Structures
Geotechnical Analysis

April 7, 1989
70084.00

Mr. Steven Luzkow
Michigan Department of Natural Resources
Remedial Action Section
P.O. Box 30028
Lansing, Michigan 48909

Re: Sturgis Well Field Feasibility Study

Dear Mr. Luzkow:

Enclosed please find three (3) copies of the final Work Plan and OF-60 for the Sturgis Well Field Feasibility Study. The scope of work, budget and schedule contained in the Work Plan reflect your comments from review of the draft Work Plan Addendum (February 1989), per our meeting of March 6, 1989. Comments from the EPA's RPM have also been incorporated.

I trust this submittal meets with your approval. Please contact me if you have any questions.

Very truly yours,

WARZYN ENGINEERING INC.

Jacques F. Gillette
Project Manager

JFG/df/DLK
[#3 MISC AK6]

Enclosure: As stated

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WORK PLAN ADDENDUM

**STURGIS WELL FIELD
Sturgis, Michigan**

Prepared for:

**Michigan Department of Natural Resources
Lansing, Michigan**

**Prepared by:
Warzyn Engineering Inc.
Novi, Michigan**

April, 1989

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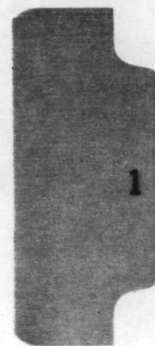
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FEASIBILITY STUDY WORK PLAN ADDENDUM
STURGIS WELL FIELD
STURGIS, MICHIGAN

SECTION 1.0
Introduction

The aquifer underlying the City of Sturgis provides water to nearly 10,000 city residents and numerous businesses, industries and service institutions. In 1982, the city's water supply was obtained from the Layne (PW-1), Jackson (PW-2), Kirsch (PW-3) and Lakeview wells (PW-4) (Figure 1). During routine chemical testing of the municipal water supply in 1982, the Michigan Department of Public Health (MDPH) found that two city wells, PW-1 and PW-2, were contaminated with trichloroethene (TCE) and tetrachloroethene (PCE).

Well PW-1 has been abandoned since January 1985, and Well PW-2 is pumped occasionally to make sure it is still functional for emergency use. In January 1985, Well PW-3 exhibited low level TCE contamination (less than 5 ug/L), thus use of this well has been significantly curtailed. PW-3 is used in times of peak demand, or at a minimum, once a month to assure that it remains functional. The City currently relies on Well PW-4 and a new Well PW-5 (Oaklawn Well) to supply the majority of the municipal water requirements. To date, the Oaklawn and Lakeview wells have not exhibited TCE and/or PCE contamination.

Warzyn Engineering Inc. (Warzyn) is conducting the Remedial Investigation/Feasibility Study (RI/FS) of the Sturgis Well Field for the Michigan Department of Natural Resources (MDNR) under MDNR Contract Number 3644. The RI is currently underway and scheduled for completion in late 1989.

Preliminary findings of the RI suggest a number of potential sources of volatile organic compound (VOC) contamination exist, however, two major potential source areas are indicated: the Sturgis Archery property at 701 Jacob Street



(formerly owned and operated by Wade Electrical) and the Kirsch Company property located at the intersection of Prospect and E. Hatch Streets (formerly Kirsch Plant 1). In addition to locating potential sources of the VOC contamination, preliminary RI efforts (Phase I) suggested the existence of more than one plume of groundwater contamination. Subsequent phases of the RI (IIA and IIB) have been initiated to further define the extent and distribution of groundwater contamination.

This Work Plan Addendum describes the activities to be performed by Warzyn to complete the FS for the Sturgis Well Field. The scope of this FS is to develop remediation alternatives for the remediation of groundwater contamination and two (2) source areas affecting the Sturgis Well Field. The following sections describe tasks necessary to conduct the FS, as performed subsequent to the RI.



SECTION 2.0 **Scope of Work**

2.1 Task 1 - Work Plan Addendum

This Work Plan Addendum serves to update the original Work Plan of July 1987. This Addendum provides details of the tasks necessary to conduct the FS for the Sturgis Well Field. Conduct of an Endangerment Assessment (EA), included as an integral part of the FS, is outlined in Task 2. The remaining tasks describe development, screening and detailed analysis of remedial alternatives, post RI/FS support, and FS project management. A revised schedule and costs for conduct of the FS are included as Figure 2 and Table 1, respectively. Upon approval by MDNR, this Work Plan Addendum will be used to direct the conduct of the FS.

2.2 Task 2 - Endangerment Assessment

The overall objective of the EA process for the Sturgis Well Field is to identify and characterize immediate and potential risks to public health and the environment associated with releases of VOC's. The EA will integrate information on the toxicity of identified VOC compounds with estimates of exposure to quantify risk, which in turn will provide justification necessary for remedial actions.

The EA for the Sturgis Well Field (SWF) will be consistent with current U.S. EPA guidance; the Superfund Public Health Evaluation Manual (SPHEM, 1986) and the Superfund Exposure Assessment Manual - Final Draft (1987).

The EA process is multi-faceted and governed to a large extent by site-dependent conditions. Included in the EA will be an evaluation and transformation of site-specific demographic, physical, chemical and biologic factors into qualitative and/or quantitative interpretations of actual or potential harm associated with the Site. Among the parameters to be considered in the EA process for the Sturgis Well Field are:

- intrinsic toxicity of identified VOC's and the relevant media (e.g., water, air, soil) in which they occur;
- medium-specific fate of the VOC's within the environment including assessments of relative release and degradation processes (i.e., physical, chemical, biological properties);
- analysis of the potential pathways and extent of exposure;
- determination of human and environmental populations at risk;
- the probability and extent to which a threat exists; and
- evaluation of estimated risk by comparison with appropriate standards.

The EA process can be divided into four components, as follow:

- Selection of contaminants
- Exposure assessment
- Toxicity assessment
- Risk characterization

2.2.1 Subtask 2.1 - Selection of Contaminants

The aim of contaminant selection is to identify a limited number of substances from the total possible contaminants to arrive at a representative group of high risk substances for subsequent characterization. This will be accomplished by screening initial sample information and selecting substances based on factors which may influence potential risk, such as concentration at the site, potential critical exposure pathways and the intrinsic toxicity of the compound. To date, preliminary RI findings suggest TCE and PCE will be the major contaminants of concern. However, all of the contaminants found at the site will be evaluated to result in the selection of "indicator chemicals" which encompass the relevant physiochemical and toxicological properties of the contaminants present. These "indicator chemicals" will be subjected to the analyses outlined in the following subtasks.

2.2.2 Subtask 2.2 - Exposure Assessment

The aim of this component of the EA process is to estimate exposure levels using a process which identifies and integrates actual and potential exposure pathways with potentially exposed human and environmental populations. This will be



accomplished by determining the mechanism of substance release into the environment, including estimating the potential release rate of the chemical from its source. Second, the environmental fate of the substance will be evaluated. In this step, environmental transport (e.g., groundwater migration), transformation (e.g., biodegradation) and transfer (e.g., volatilization) processes are considered. Finally, potential exposed populations will be identified and the uptake and absorption of the substances will be calculated to determine expected exposure levels.

2.2.3 Subtask 2.3 - Toxicity Assessment

Existing literature will be reviewed and the toxic effects of the substances will be evaluated to determine the nature and extent of the hazards associated with exposure. A qualitative description of the toxic effects, as well as quantitative data such as no-effect levels and established acceptable levels, will be generated to provide toxicity profiles for each substance.

2.2.4 Subtask 2.4 - Risk Characterization

Characterization of risk requires integrating information developed during the exposure and toxicity assessments to yield characterization of actual or potential risks. Exposure levels from the various pathways will be compared with "acceptable levels" defined by regulatory legislation and guidelines to determine if the substances pose a risk. The risk characterization will address several types of actual and potential risks, including carcinogenic risks and non-carcinogenic risks. Discussions will be held between Warzyn, MDNR and U.S. EPA representatives to determine the acceptable contaminant concentrations and methodologies used during this characterization.

2.2.5 Subtask 2.5 - Summary of EA Findings

Findings of the EA will be summarized and submitted to the MDNR Project Administrator in the form of a letter report. The MDNR Project Administrator will be responsible for coordinating review of the letter report and compiling appropriate agency review comments for submittal to Warzyn. Upon receipt from MDNR, Warzyn will incorporate the comments into the EA letter report and the report will become part of the Feasibility Study Report outlined in Section 2.7, Task 7 of this Work Plan.



2.3 Task 3 - Develop Remedial Action Objectives

Remedial action objectives will be developed to address the soil and groundwater contamination, indicating contaminant levels and exposure routes identified in the RI and EA. The remedial action objectives will be aimed at protecting human health and the environment and will specify the contaminants of concern, the exposure routes and receptors, and the acceptable contaminant level or range of levels for each exposure route (as provided by MDNR). At a minimum, these objectives will be based on:

- Public health and environmental concerns;
- Information gathered during the Remedial Investigation;
- The requirements of Section 121 of the Superfund Amendments and Reauthorization Act (SARA) of 1986;
- The revised National Contingency Plan (NCP) and/or appropriate interim guidance; and
- Current U.S. EPA guidance, advisories, and the requirements of other applicable U.S. EPA, Federal, and MDNR environmental standards.

2.4 Task 4 - Develop Remedial Alternatives

Development of remedial alternatives involves numerous steps to facilitate increasingly specific definitions of potential remedial activities. These steps utilize the findings of the RI, as well as consideration of the EA, and are comprised of the following:

2.4.1 Subtask 4.1 - Develop General Response Actions

General response actions will be developed which will satisfy the remedial action objectives identified in Task 3. Such actions may include treatment, containment, excavation, extraction, disposal, institutional actions, or a combination thereof. The general response actions will be medium-specific and will provide a basis from which further refining can be accomplished and specific technologies can be identified.

2.4.2 Subtask 4.2 - Identify Remedial Technologies and Process Options

Specific remedial technologies will be identified to correspond to the general response actions established in Subtask 4.1. These remedial technologies may include chemical treatment, thermal destruction, solidification, capping or dewatering. Process options, specific processes within each technology type, will then be identified for each remedial technology. Finally, process options and remedial technology types will be judged against the remedial action objectives developed in Task 3, as well as site-specific conditions. Those technologies and/or options which may prove difficult to implement or inappropriate will be modified or eliminated from further consideration.

2.4.3 Subtask 4.3 - Identify Remedial Alternatives

Alternatives will be developed to incorporate remedial action objectives, selected remedial technologies, and other appropriate considerations into a comprehensive, site-specific approach. Should multiple areas of concern be identified in the RI, discussions will be held with MDNR to determine whether alternatives should be developed to address each area separately or the entire site as a whole. The following types of remedial alternatives shall be developed (to the extent possible and appropriate):

- Alternatives which utilize permanent solutions and alternative treatment or resource recovery technologies;
- Alternatives for treatment or disposal at on-site and off-site facilities;
- Alternatives which rely primarily on containment of wastes with little or no treatment;
- Alternatives which employ treatment technologies for reducing toxicity, mobility or volume;
- Alternatives that attain or exceed applicable or relevant and appropriate Federal and State public health and environmental requirements (ARARs);
- Alternatives that may not attain applicable or relevant and appropriate Federal and State public health and environmental requirements under one or more of the circumstances outlined in CERCLA Section 121(d)(4); and
- No action alternative.



There may be overlap among the alternatives developed, and alternatives outside of these categories may also be generated. Alternatives will be developed in consultation with U.S. EPA and MDNR. The rationale for excluding any technology identified in Subtask 4.2 will be provided.

2.4.4 Subtask 4.4 - Initial Screening of Alternatives

Prior to detailed evaluation, the alternatives developed in the preceding subtask will be screened to eliminate those that are not feasible or are inappropriate. The three criteria which form the basis for the initial screening are effectiveness, implementability, and cost. Specific factors that may be considered as part of this screening include:

1. Effectiveness

- Protection of human health and the environment;
- Significant and permanent reduction of toxicity, mobility and/or volume of waste;
- Technical reliability, in terms of the potential for failure and need for replacement of the remedy; and
- Other effectiveness factors identified for the site.

2. Implementability

- Technical feasibility, in terms of constructability, reliability, monitoring requirements, maintenance requirements;
- Administrative feasibility, in terms of permitting, likelihood of favorable community response, approvals by coordination with other agencies, and the institutional ability to monitor, maintain or replace technologies; and
- Availability, in terms of general commercial availability, capability and capacity of off-site treatment, storage and disposal facilities, equipment and specialists.

3. Cost

- Capital cost;
- Long-term operation and maintenance (O&M) cost;
- Cost will only be used for screening when comparing alternatives providing similar effects. At this level of analysis, costs will be estimated in qualitative terms of "low", "moderate", and "high".

The purpose of the screening is to reduce the number of potential remedial actions for consideration in subsequent tasks. The most promising alternatives will be carried through the screening for detailed analysis in Task 5. Alternatives will not be eliminated prematurely on the basis of cost alone.

2.4.5 Subtask 4.5 - Alternatives Array Document

Upon completion of Subtask 4.4, the U.S. EPA will be asked to notify Warzyn of applicable or relevant and appropriate requirements (ARARs) related to the remaining remedial alternatives. To facilitate this, an alternatives array document will be prepared by Warzyn to summarize site description, technology identification and screening, and alternatives development and screening. The document will be submitted to MDNR, who will in turn distribute it to appropriate sections and/or agencies for review and identification of ARARs. As appropriate, MDNR and U.S. EPA will update the identified ARARs throughout the FS process.

2.5 Task 5 - Detailed Analysis of Remedial Alternatives

The remedial alternatives remaining upon completion of Task 4 will be subjected to detailed analysis. As part of this process, the alternatives will be refined and more fully developed. One set of site-wide alternatives will be developed for the two media of concern, soil and ground water. A maximum of ten (10) alternatives will be developed and analyzed to address soil contamination; a maximum of six (6) alternatives will be developed and analyzed to address groundwater contamination. The major purpose of this task is to assess the ability of each alternative to meet established remedial action objectives,



to enable comparison of alternatives, and to provide the necessary information to qualify selection of a particular remedial alternative. Accordingly, the level of detail used at this stage of evaluation is greater than that used during the initial screening. Seven criteria facilitate this detailed analysis:

- Short-term Effectiveness. This criterion examines the effectiveness of alternatives in protecting human health and the environment during the construction and implementation period until remedial action objectives have been met.
- Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of alternatives in protecting human health and the environment after remedial action objectives have been met.
- Reduction of Toxicity, Mobility, and Volume. This criterion evaluates the anticipated performance of the specific treatment technologies with respect to toxicity, mobility and volume reduction.
- Implementability. This criterion evaluates the technical and administrative feasibility of alternatives and the availability of required resources.
- Cost. This criterion evaluates the capital and O&M costs of each alternative.
- Compliance with ARARs. This criterion describes how the alternative complies with ARARs, or if a waiver is required and how it is justified. The assessment includes information from advisories, criteria, and guidance the lead and support agencies have provided.
- Overall Protection. This criterion describes how the alternative, as a whole, protects and maintains protection of human health and the environment.

2.6 Task 6 - Comparative Analysis of Alternatives

Upon completion of Task 5, a comparative analysis will be conducted to evaluate the relative performance of each remedial alternative in relation to each of the seven criteria outlined in Task 5. The purpose of this comparative analysis is to identify the relative advantages and disadvantages of each alternative. The key features of each alternative, with respect to the seven criteria, will be summarized and a narrative discussion will be provided to describe the advantages and disadvantages.



2.7 Task 7 - Feasibility Study Report

An initial draft FS report will be prepared which presents the results of the Feasibility Study tasks outlined herein, including the findings of the EA (see Section 2.2.5, Task 2.5). Six copies of the initial draft FS Report will be submitted to the MDNR Project Administrator for distribution to appropriate agencies for review. Comments from review of the initial draft FS Report will be incorporated into a final draft FS Report. Six copies of the final draft FS Report will be submitted to the MDNR Project Administrator for distribution to appropriate agencies for review. The MDNR Project Administrator will be responsible for coordinating review of the initial and final draft FS Reports and compiling appropriate agency review comments for submittal to Warzyn. A total of two (2) meetings will be held between Warzyn, MDNR and the U.S. EPA to discuss comments on the draft FS Reports: one (1) meeting for the initial draft FS Report and one (1) meeting for the final draft FS Report.

Comments generated from review of the final draft FS Report will be incorporated into a Public Comment FS Report. Six copies of the Public Comment FS Report will be submitted to the MDNR Project Administrator for distribution and use during the public comment period.

2.8 Task 8 - Post RI/FS Support

Activities that occur after release of the FS for public comment will be addressed as part of this task. These activities may include:

- Assist in preparation and/or review of the Responsiveness Summary to address public comments;
- Assist in preparation of a plan of implementation;
- Attendance at public meetings;
- Technical support in preparation of the Record of Decision (ROD);
- Preparation of FS addenda; and
- Review and quality control of work efforts.



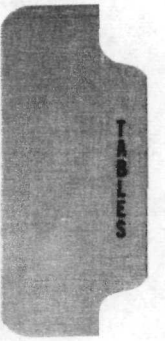
Technical support provided under this task will be considered complete upon utilization of the budgeted amount for this task.

2.9 Task 9 - Feasibility Study Project Management

Project management includes the day-to-day direction of the project, scheduling of activities, compliance with contract administration requirements, review of invoices and other administrative duties. Also included are Warzyn's internal quality assurance/quality control review procedures, as well as monthly project progress summaries and bi-weekly contacts with the MDNR Project Administrator. Invoices will be submitted monthly to MDNR.

DLK/hc/JFG/KJQ/RLM/KJD
[#2 MDNR AA7]
R7 040589





STURGIS FEASIBILITY STUDY
COST ESTIMATE
MARCH, 1989

		TASK 5 DETAILED ANALYSIS	TASK 6 COMP ANALYSIS	TASK 7 FS REPORT	TASK 8 POST RI/FS SUPPORT	TASK 9 PROJECT MGMT	PROJECT TOTALS
LABOR(hrs)							
P4		16	20	24	10	60	194
P3		48	40	80	40	160	632
P2		40	24	160	40	20	880
P1		6	8	32	0	0	162
T3		16	8	40	0	20	150
Office		10	16	80	20	16	265
TOTAL LABOR		136	116	416	110	276	2283
P4	\$40.46	\$647.36	\$809.20	\$971.04	\$404.60	\$2,427.60	\$7,849.24
P3	\$30.14	\$1,446.72	\$1,205.60	\$2,411.20	\$1,205.60	\$4,822.40	\$19,048.48
P2	\$23.24	\$929.60	\$557.76	\$3,718.40	\$929.60	\$464.80	\$20,451.20
P1	\$16.43	\$98.58	\$131.44	\$525.76	\$0.00	\$0.00	\$2,661.66
T3	\$17.11	\$273.76	\$136.88	\$684.40	\$0.00	\$342.20	\$2,566.50
Office	\$9.54	\$95.40	\$152.64	\$763.20	\$190.80	\$152.64	\$2,528.10
Total Direct Labor Cost		\$3,491.42	\$2,993.52	\$9,074.00	\$2,730.60	\$8,209.64	\$55,105.18
Direct Labor Overhead	0.556	\$1,941.23	\$1,664.40	\$5,045.14	\$1,518.21	\$4,564.56	\$30,638.48
G&A Overhead	1.252	\$4,371.26	\$3,747.89	\$11,360.85	\$3,418.71	\$10,278.47	\$68,991.69
TOTAL LABOR COST		\$9,803.91	\$8,405.80	\$25,479.79	\$7,667.52	\$23,052.67	\$154,735.35
Expense Item							
Airfare		\$2,340.00	\$0.00	\$1,170.00	\$0.00	\$0.00	\$5,850.00
Rental Vehicle		\$160.00	\$0.00	\$80.00	\$0.00	\$0.00	\$480.00
Mileage		\$51.00	\$0.00	\$102.00	\$153.00	\$459.00	\$1,122.00
Subsistence		\$98.00	\$0.00	\$147.00	\$147.00	\$686.00	\$1,568.00
Per Diem		\$448.00	\$0.00	\$224.00	\$0.00	\$0.00	\$1,120.00
Copies/photos/etc.		\$40.00	\$20.00	\$400.00	\$0.00	\$40.00	\$1,140.00
Word Processing		\$120.00	\$192.00	\$960.00	\$240.00	\$192.00	\$3,180.00
FAX		\$60.00	\$12.00	\$60.00	\$12.00	\$60.00	\$432.00
Miscellaneous		\$331.70	\$22.40	\$314.30	\$55.20	\$143.70	\$1,489.20
TOTAL EXPENSE COST		\$3,648.70	\$246.40	\$3,457.30	\$607.20	\$1,580.70	\$16,381.20
Subcontracts							
JOHNSON/MALHOTRA		\$7,691.38	\$7,118.99	\$4,352.47	\$0.00	\$0.00	\$38,805.37
TOTAL SUBCONTRACTS COST		\$7,691.38	\$7,118.99	\$4,352.47	\$0.00	\$0.00	\$38,805.37
Fee							
Labor	0.10	\$980.39	\$840.58	\$2,547.98	\$766.75	\$2,305.27	\$15,473.53
Expenses	0.10	\$364.87	\$24.64	\$345.73	\$60.72	\$158.07	\$1,638.12
Subcon.	0.05	\$384.57	\$355.95	\$217.62	\$0.00	\$0.00	\$1,940.27
TOTAL FEE		\$1,729.83	\$1,221.17	\$3,111.33	\$827.47	\$2,463.34	\$19,051.92
TOTAL EST. SUBTASK COST		\$22,873.82	\$16,992.36	\$36,400.89	\$9,102.20	\$27,096.71	\$228,973.84

STURBIS FEASIBILITY STUDY
COST ESTIMATE
APRIL 1989

*5/15/89
Talked w/
Steve*

*agreed upon
520*

725

	TASK 1 WORK PLAN	TASK 2.1 SELECTION OF CONTAMINANTS	TASK 2.2 EXPOSURE ASSESSMENT	TASK 2.3 TOXICITY ASSESSMENT	TASK 2.4 RISK CHARACTER	TASK 2.5 EA LETTER REPORT	TASK 3 REMEDIAL OBJECTIVES	TASK 4.1 DEVELOP GEN RESP ACTIONS	TASK 4.2 ID REN TECHNOL	TASK 4.3 ID REN ALTERNATIVES	TASK 4.4 INITIAL SCREENING	TASK 4.5 ALTER ARRAY DOC
LABOR (hrs)												
P4	4	4	4	8	4	16		4	4	4	4	4
P3	24	16	36	16	12	60		8	12	24	16	16
P2	80	24	120	80	40	80		16	16	30	30	40
P1	0	0	0	40	0	40		0	0	20	16	0
T3	4	0	16	0	0	24		0	0	12	0	10
Office	12	13	24	24	0	24		4	2	4	4	8
TOTAL LABOR	124	57	200	168	56	244	72	32	34	94	70	78
P4	\$40.44	\$161.84	\$161.84	\$323.68	\$161.84	\$647.36	\$161.84	\$161.84	\$161.84	\$161.84	\$161.84	\$161.84
P3	\$30.14	\$723.36	\$482.24	\$1,085.04	\$482.24	\$361.68	\$1,808.40	\$723.36	\$241.12	\$361.68	\$482.24	\$482.24
P2	\$23.24	\$1,859.20	\$557.76	\$2,788.80	\$1,859.20	\$929.60	\$1,859.20	\$929.60	\$371.84	\$371.84	\$497.20	\$929.60
P1	\$16.43	\$0.00	\$0.00	\$657.20	\$0.00	\$657.20	\$0.00	\$0.00	\$0.00	\$328.60	\$262.88	\$0.00
T3	\$17.11	\$68.44	\$0.00	\$273.76	\$0.00	\$410.64	\$0.00	\$0.00	\$0.00	\$205.32	\$0.00	\$171.10
Office	\$9.54	\$114.48	\$124.02	\$228.96	\$0.00	\$228.96	\$38.16	\$38.16	\$19.08	\$38.16	\$38.16	\$76.32
Total Direct Labor Cost		\$2,927.32	\$1,325.86	\$4,538.40	\$3,551.28	\$1,433.12	\$5,611.76	\$1,852.96	\$812.96	\$914.44	\$2,154.48	\$1,442.32
Direct Labor Overhead	0.556	\$1,627.59	\$737.18	\$2,523.35	\$1,974.51	\$807.93	\$3,120.14	\$1,030.25	\$452.01	\$308.43	\$1,197.89	\$913.13
G&A Overhead	1.252	\$3,665.00	\$1,659.98	\$5,682.08	\$4,446.20	\$1,819.31	\$7,025.92	\$2,319.91	\$1,017.83	\$1,194.88	\$2,697.41	\$2,036.18
TOTAL LABOR COST		\$8,219.91	\$3,723.01	\$12,743.83	\$9,971.99	\$4,080.36	\$15,757.82	\$5,203.11	\$2,282.79	\$2,547.78	\$4,611.43	\$3,511.65
Expense Item												
Airfare	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1,170.00	\$385.00	\$0.00	\$0.00	\$385.00	\$0.00	\$0.00
Rental Vehicle	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$80.00	\$80.00	\$0.00	\$0.00	\$80.00	\$0.00	\$0.00
Mileage	\$51.00	\$0.00	\$0.00	\$0.00	\$0.00	\$51.00	\$51.00	\$0.00	\$51.00	\$51.00	\$0.00	\$51.00
Subsistence	\$98.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$98.00	\$98.00	\$0.00	\$98.00
Per Diem	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$224.00	\$112.00	\$0.00	\$0.00	\$112.00	\$0.00	\$0.00
Copies/photos/etc.	\$60.00	\$40.00	\$0.00	\$40.00	\$40.00	\$200.00	\$0.00	\$0.00	\$20.00	\$40.00	\$100.00	\$100.00
Word Processing	\$144.00	\$156.00	\$288.00	\$288.00	\$0.00	\$288.00	\$48.00	\$48.00	\$24.00	\$48.00	\$48.00	\$96.00
FAI	\$12.00	\$0.00	\$12.00	\$12.00	\$12.00	\$60.00	\$12.00	\$12.00	\$12.00	\$36.00	\$36.00	\$12.00
Miscellaneous	\$34.50	\$19.60	\$30.00	\$34.00	\$5.20	\$207.30	\$93.70	\$6.00	\$15.60	\$105.00	\$33.30	\$33.70
TOTAL EXPENSE COST		\$401.50	\$215.60	\$330.00	\$374.00	\$57.20	\$2,280.30	\$1,030.70	\$66.00	\$171.60	\$1,155.00	\$366.30
Subcontracts												
JOHNSON/MALHOTRA	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1,385.27	\$8,315.63	\$3,589.97	\$4,351.66
TOTAL SUBCONTRACTS COST		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1,385.27	\$8,315.63	\$3,589.97	\$4,351.66
Fee												
Labor	0.10	\$821.99	\$372.30	\$1,274.38	\$997.20	\$408.04	\$1,575.78	\$520.31	\$228.28	\$234.77	\$664.98	\$661.16
Expenses	0.10	\$40.15	\$21.56	\$33.00	\$37.40	\$5.72	\$228.03	\$103.07	\$6.60	\$17.16	\$113.90	\$36.63
Subcon.	0.05	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$49.26	\$415.78	\$179.50
TOTAL FEE		\$862.14	\$393.86	\$1,307.38	\$1,034.60	\$413.76	\$1,803.81	\$623.38	\$234.88	\$343.20	\$1,136.26	\$677.29
TOTAL EST. SUBTASK COST		\$9,483.56	\$4,332.48	\$14,381.21	\$11,380.59	\$4,551.32	\$19,841.93	\$6,857.19	\$2,583.67	\$4,467.82	\$16,656.67	\$9,245.20

*54,487.53 → only and
sub 40K*

Table 2
Sturgis Feasibility Study
Project Schedule

[illegible]

